Strathcona Timber Supply Area

Vegetation Resources Inventory

Strategic Inventory Plan

PREPARED BY:

STRATHCONA TSA COMMITTEE

REVISED: AUGUST 2004

EXECUTIVE SUMMARY

This Vegetation Resources Inventory (VRI) Preliminary Strategic Inventory Plan (VSIP) outlines the VRI activities and products that address forest management and inventory issues in the Strathcona Timber Supply Area (TSA 37). The stakeholders for this project include International Forest Products, Hecate Logging, Nootka Sound Economic Development Corporation, TFL Forest Ltd, Canadian Forest Products, Weyerhaeuser Canada, Western Forest Products Inc., British Columbia Timber Sales, Ministry of Sustainable Resource Management and Ministry of Forests.

The following VRI activities and products are planned:

1. Conduct a Phase I photo-interpretation over the entire Strathcona TSA. The Phase I database will support timber-emphasis inventories, habitat mapping, ecosystem mapping, riparian mapping, and other applications.
2. Conduct Phase 2 timber emphasis ground sampling in the Vegetated Treed area of the TSA to provide statistically valid timber volumes and polygon-specific tree attributes for the subsequent timber supply reviews. The ground sampling will include Net Volume Adjustment Factor (NVAF) sampling to check loss factors and taper equations.
3. Conduct finer polygon delineation and timber emphasis ground sampling in the second growth stands in the Strathcona TSA to improve species composition descriptions and spatial data for these stands.

The approximate number of ground sample plots and costs for the proposed VRI activities are given in Table 5 of this report.

These VRI activities and products will support timber supply objectives and other resource specific interpretations. They may be implemented in smaller units (e.g., Management Zones) across the TSA. They may also be jointly implemented to address common management issues within the Coast Region.

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1. INTRODUCTION

1.1 Background

This Vegetation Resources Inventory (VRI) Strategic Inventory Plan (VSIP) outlines VRI activities and products needed to address forest management and inventory issues in the Strathcona Timber Supply Area (TSA 37). The VSIP provides details for photo interpretation and timber emphasis ground sampling in the TSA. After VSIP approval, the next steps are the preparation of project implementation plans (VPIPs) based on this VSIP, and the implementation of the VPIPs.

The Strathcona VRI Committee is comprised of willing participants operating within the Strathcona Timber Supply Area, including British Columbia Timber Sales, International Forest Products Ltd., Hecate Logging Ltd., Nootka First Nations, Nootka Sound Economic Development Commission, TFL Forest Ltd., Canadian Forest Products Ltd., Raven Forest Products Ltd., Western Forest Products Inc and Weyerhaeuser Canada Ltd.

1.2 VRI Overview

The VRI is a vegetation (forest) inventory process that has been approved by the Resources Inventory Committee (RIC) to assess the quantity and quality of BC's timber and vegetation resources. The VRI estimates overall population totals and averages, as well as individual polygon attributes, for timber and non-timber resources. Its design is simple, reasonably efficient, statistically defensible, and addresses issues raised by the Forest Resources Commission in its 1991 report, *The Future of Our Forests*.

The VRI consists of several components (Appendix II):

1. BC Land Cover Classification Scheme (BCLCS)
2. Photo Interpreted Estimates (Phase I)
3. Ground Sampling (Phase II) – timber emphasis, ecology, coarse woody debris
4. Net Volume Adjustment Factor (NVAF) sampling
5. Within Polygon Variation (WPV) sampling
6. Statistical Adjustment.

One or more of these components can address specific forest management or inventory issues. For more information, VRI manuals are available through the internet at http://srmwww.gov.bc.ca/risc/pubs/teveg/index.htm.

1.3 VRI Planning

The VRI planning process requires that a Strategic Inventory Plan (VSIP) and Project Implementation Plan (VPIP) are developed for defined units (e.g. TSA, TFL). A VSIP outlines VRI products to address forest management issues and provides strategic direction for implementing the inventory activities. A VPIP details the operational activities identified in the VSIP (e.g., ground sampling or photo interpretation projects) and identifies project areas, priorities, plot location, yearly inventory costs, and roles and responsibilities. Guidelines for preparing the VSIPs and VPIPs are available on the Internet at http://srmwww.gov.bc.ca/tib/fia/vri.htm.

The VRI planning process is an important component of the overall VRI process and related activities (Figure 1 and Appendix III). The intent of the VRI planning process is to ensure that baseline products meet a range of applications and they are efficiently implemented. These processes and activities include:

1. Forest management decision processes (land integration planning)
2. Identifying forest management issues
3. VRI Strategic planning (prepare a VSIP)
4. VRI operational planning (prepare VPIPs)
5. Implementation, including development and maintenance of procedures and standards;
   a). Management inventories
   b). Database management
   c). Data interpretation

The steps for preparing a VSIP include:

1. Licensee stakeholders work with MSRM and MOF staff to develop issue statements related to VRI.
2. Licensee stakeholders work with MSRM to prepare a VRI "Forest Management and Inventory Issues Discussion Paper". This paper explains the VRI process and identifies key issues known to date. Issues are usually taken from the Timber Supply Review Data Package, plus any other issues identified in Step 1. This discussion paper is circulated before the VRI Stakeholders meeting.
3. The Strathcona VRI Committee, including all agencies and stakeholders, meets to refine issues and discuss why these issues need to be considered fundable. The purpose of this meeting is to:
   a). Introduce the VRI tools and process

b). Table new issues and issues recorded to date

c). Discuss issues that can be funded or not (under current funding mechanisms); this discussion provides general direction for developing the VSIP. This discussion also affects the extent of photo interpretation and the number and type of VRI plots.

d). Suggest the VRI tools to address currently fundable issues as well as those issues that may be funded in the future.

4. Strathcona VRI Committee meeting minutes are prepared and circulated to all participants for review and feedback.
5. Strathcona VRI Committee prepares a preliminary VSIP, which is reviewed and discussed through a conference call.
6. Strathcona VRI Committee prepares a final VSIP, which incorporates items agreed to in Step 5 and is signed off by committee members.
7. VPIP process begins

The steps for preparing a VPIP include:

1. Review and update VSIP recommendations
2. Secure funding
3. Identify project activities, geographic areas, and costs
4. Specify roles and responsibilities for project implementation
5. Prepare VPIP

1.4 Funding

Strathcona VRI Committee develops criteria for setting VRI activity priorities and products identified during the planning process. Inventory funding, or follow-up resource-specific management interpretations, is excluded from the planning process since funding mechanisms may vary. Currently, funding for VRI activities are FIA eligible.

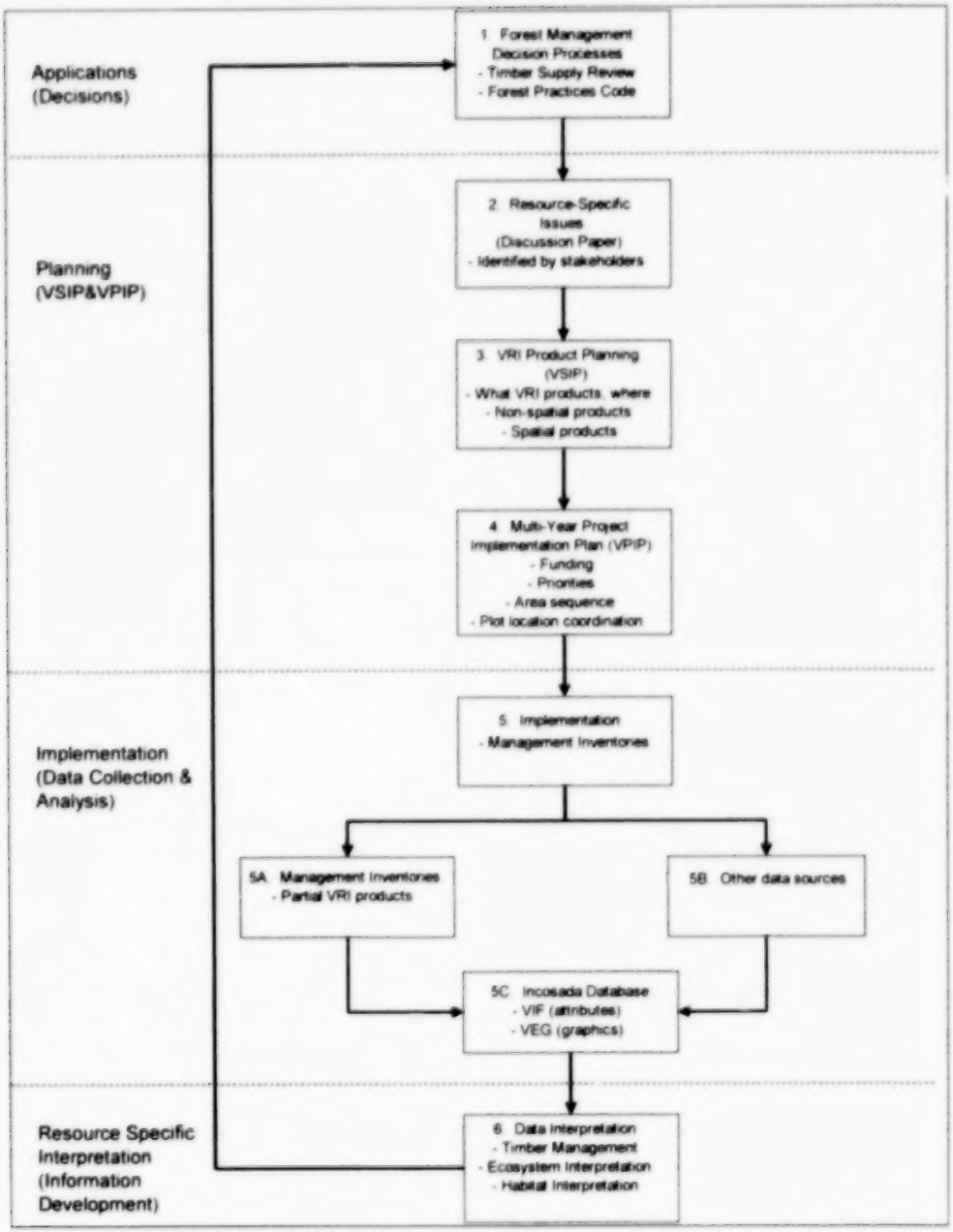

Figure 1. The VRI management inventory process.

2. BUSINESS CONSIDERATIONS

2.1 Landbase

The jurisdiction of the Strathcona TSA covers 395,694 ha of land (Table 1). The main tree species in the forested landbase are hemlock/balsam (56%), cedar (20%), Douglas fir (18%), yellow cedar (3%), pine (1%) and deciduous (2%) (Table 2). In this report, we assume that the forested landbase corresponds to the Vegetated Treed (VT) landbase (BC Landcover Classification Scheme, or BCLCS).

Table 1. Landbase by forest cover.[1]

	Area (ha)	%
Forested	329,817	
Mature		46
Immature		54
NSR	12,473	
Non commercial	78.8	
Non productive	53,325	
Grand Total	395,694	

2.2 Forest Management Considerations

Significant forest management issues in the Strathcona TSA were highlighted in the last timber supply review determination (TSR 2 – Jan 1, 2000) and in the TSR 3 Data Package. These issues are summarized in Table 3.

Other emerging data needs were considered to be relevant to the Strathcona TSA and could be addressed with a completed VRI

1. Park inventories
2. Check growth and yield predictions
3. Meet market certification requirements

Table 2. Forested landbase by species

Leading species	Area (ha)	%
Hemlock	169,272	51.3
Western Red Cedar	65,321	19.8
Douglas-fir	57,912	17.6
Balsam	14,082	4.3
Yellow cedar	10,514	3.2
Pine/Spruce*	5,106	1.5
Deciduous**	7,611	2.3
Grand Total	329,817	100.0

*lodgepole pine, western white pine, sitka spruce

** black cottonwood, bigleaf maple, red alder

[1] Data from the TSR 3 spatial database.

Table 3: Forest Management Issues

	Issue[2]	VRI Implication		Remarks
		Photo-Interpretation (Phase 1)	Ground Sampling (Phase II)	
1	Inventory audit (November 2000)indicates volume is overestimated by 14%:	Required	Required	Volume estimates from VRI ground sampling will provide additional data to adjust inventory estimates. VRI data is also required to complete accurate timber supply calculations for each of the Landscape Units in the TSA.
2	Operability criteria: re examine the distribution	Required	Required	VRI may provide additional information to use in confirming the distribution of merchantable timber in the TSA.
3	Stand & Landscape Biodiversity:	Required	Required	Spatial data derived from the photo interpretation and ground sampling may provide additional information useful in delineating wildlife tree patches, ungulate winter ranges, seral stage and stand attributes.
4	Riparian management:	Required	Required	Spatial data from photo interpretation may provide additional information for riparian area designation.
5	Land use planning:	Required	Required	Updated forest cover data provided by the VRI could be used to in the process of identifying areas of interest specific to the land use objective at hand. VRI data is also required to complete accurate timber supply calculations for each of the Landscape Units in the TSA.
6	Visual Quality Objectives:	Required	Optional	VRI will provide updated spatial information useful in effectively assessing visual impact of timber harvesting activities.
7	Coastal Watershed Assessments (CWAPs):	Required	Optional	VRI will provide updated forest cover data (eg seral stage) which could be useful in completing CWAPs

[2] Issues compiled from the September 2002 Draft TSR3: Strathcona Timber Supply Area

Table 4. List of parks and protected areas[3] in the Strathcona TSA.

Provincial/Regional Parks		
Brooks Peninsula	Loveland Bay	Mt. Cain
Elk Falls	Miracle Beach	Schoen Lake
Kin Beach	Mitlenatch Island Nature	Strathcona
Kitty Coleman Beach	Morton Lake	Strathcona Westmin
Protected Areas		
Artlish Caves	Nuchatlitz	White Ridge
Bligh Island	Santa-Boca	White River
Gold Muchalat	Small Inlet	Wood Mountain Ski
Lower Tsitika River	Tahsish-Kwois	Woss Lake
Main Lake	Weymer Creek	
Ecological Reserves		
Checleset Bay	Mount Derby	Tahsish-Kwois
Clanninick Creek	Mount Elliot	Tsitika Mountain
Comox Lake Bluffs	Robson Bight (Michael Bigg)	Tsitika River
Marine Parks		
Big Bunsby	Octopus Islands	Rugged Point
Catala Island	Rebecca Spit	Surge Narrows
Dixie Cove	Rock Bay	Thurston Bay

2.3 Current Forest Cover Inventory

The Strathcona TSA was re-inventoried in two projects, dating from 1987-1992. In the first project, data for the Kyuquot Supply Block was compiled in 1987-88 utilizing 1986 1:15,000 black and white aerial photography. In the second project, forest cover for the Sayward and Loughborough Supply Blocks was re-inventoried in 1991-92 utilizing 1:15 000 black and white aerial photography that was acquired in 1991. A disturbance update of the TSA was completed in 1996 utilizing 1:40,000 black and white aerial photography.

In 2002, the Artlish-Tashish area in the Kyuquot Supply Block was flown with 1:25 000 color photography in conjunction with TFL 37. This photo was scanned and a complete new Phase 1 VRI is currently being completed for the Artlish and Tashish landscape units and Schoen Lake Park via softcopy.

There have been no inventory updates since 1997. The MoF have completing an "ad hoc" update for TSR 3 using Landsat imagery, forest cover and FDPs. They have used the imagery to develop the depletion polygons, then developed an age class distribution and applied it to these polygons. The regular updates still need to be completed.

[3] The total area of the Ecological Reserves, Protected Areas, Marine Parks and Parks is approximately 269,000 ha.

Uncertainty with regard to the forest inventory initiated an audit that was completed in 1999. The audit reviewed tree height, age and volume for forest stands greater than 60 years old. It also reviewed height, age and productivity for immature stands. Audit results showed that audit and inventory volumes were 591 m3/ha each, whereas the ground attribute volume was 521 m3/ha. The difference between the audit and the ground attribute volume is called the model bias (attributed to VDYP). On the other hand the difference between the ground attribute and inventory volume is equal to the attribute bias (i.e. the bias associated with the inventory classification attributes). Adding these biases together yields the total bias, which in this case is zero, since the model and attribute bias offset each other exactly.

The inventory classification results for old growth timber measured accuracy at 62%, within reasonable limits. However, only 30% of the growth type assignments for second growth timber matched the corresponding audit growth type group assignment. Improvements are required in the species classification of the immature component of the inventory, since only 30% of growth types are "growing" on the right yield curves. This issue is of considerable concern given that 90% of the forested area in the Sayward Supply Block is second growth timber and the need to harvest more timber in this block in the very near future.

In preparation for TSR 2, Timber Supply Branch re-stratified the audit samples and analyzed plots found within the timber harvesting landbase, instead of the operable and inoperable landbases. Their results showed a 13% volume over-estimate, but only in the "eastern" part of the TSA (Sayward and Loughborough Supply Blocks). Therefore, short term timber supply estimates were forecast to remain unaffected because this error only affects 5% of the THLB. However, mid-term harvests were forecast to decrease.

In preparation for a new inventory, 1:25 000 color photo was acquired in 2002 for a portion of the Kyuquot Block. The rest of the Strathcona TSA was flown with 1:15 000 color photography in 2003.

2.4 Summary of Inventory Issues

The following inventory issues were identified by stakeholders:

1. Check regenerated stand volume estimates from TIPSY models
2. Second growth forest stands require better species composition, growth type group and height estimation
3. The current forest inventory has not had a disturbance update since 1997
4. Inventory to be brought up to VRI standards
5. Silviculture history and free growing information requires significant improvement
6. Operability line delineation
7. Quantify non-recoverable (gross) losses from windthrow, insects and disease
8. Park inventories
9. Check and update species composition labels for deciduous and deciduous-coniferous mixed stands
10. A site index adjustment study is required
11. Confirm accuracy of loss factors and taper equations
12. Wildlife habitat supply
13. The overall timber inventory appears to be over-estimated
14. Certification
15. Data management

2.5 VRI Activities and Products

The following VRI activities and products are needed to address the forest management issues identified for the Strathcona TSA. These recommendations are based on the issues identified in Table 3 and Section 2.3, including the discussions at the stakeholders meeting.

1. Acquire new photography (completed in 2003)
2. Work required to collect and clean-up past silviculture (Part of Phase 1)
3. Conduct a Phase I photo-interpretation for the entire Strathcona TSA. The Phase I database will support timber-emphasis inventories, habitat mapping, ecosystem mapping, riparian mapping, and other applications over the TSA.
4. Conduct Phase II timber emphasis ground sampling in the vegetated-treed areas of the TSA, to provide statistically valid timber volumes and polygon-specific tree

attributes. These data will support the next timber supply review (TSR) in the Strathcona TSA in 2006.

5. In concert with the ground sampling, conduct Net Volume Adjustment Factor (NVAF) sampling to check loss factors and taper equations for several tree species.

A preliminary strategic inventory plan to address the identified products so far is outlined in section 3.

3. STRATEGIC INVENTORY PLAN

3.1 Overview

This section outlines a preliminary strategic inventory plan to develop specific VRI products discussed in Section 2.5. The VRI products include a new spatial vegetation inventory (Phase I) over the entire Strathcona TSA and a timber emphasis inventory primarily in the operable portion of the vegetated treed landbase. These products can be obtained through completion of VRI photo interpretation, ground sampling and statistical adjustment.

3.2 Photo-Interpretation (Phase 1)

3.2.1 Objective

The objective is to improve TSA polygon information – especially in areas where specific management issues occur – using photo interpretation. The VRI product is a spatial database consisting of unadjusted photo-interpreted estimates. Ground sampling, used to check and adjust the photo-interpreted estimates, is discussed as a separate process (Section 3.3).

3.2.2 Target Area

The entire TSA should be updated to VRI standards either through new photo interpretation (including woodlots, parks and protected areas).

3.2.3 Target Attributes

All attributes listed on the VRI photo interpretation attribute form will be targeted. These attributes will be interpreted to current VRI photo interpretation standards.

3.2.4 Methods

The Phase 1 inventory will be completed using photo prints and traditional methods (hardcopy) of line delineation and digital capture (i.e. mono-restitution). Air and ground field calibration will be established by the photo interpreters to gain local knowledge and improve VRI attribute estimation.

The 1:15 000 color photo will improve identification of species composition which is a concern in the current forest inventory. Color photography may also improve detection of individual trees or small groups of trees severely affected by disease or insect.

3.3 Timber Emphasis Inventory – Vegetated Treed Areas

3.3.1 Ground Sampling Objectives

The main objective of the ground sampling timber emphasis inventory is to:

> *Install an adequate number of Phase II VRI sample clusters to statistically adjust the photo interpreted timber inventory attributes in the Vegetated Treed (VT) areas of the TSA, to achieve a sampling error between 10 and 15% (95% probability) for overall net timber volume in the VT area, and reasonably accurate individual polygon adjusted estimates.*

Net timber volume is gross volume less stumps, tops, decay, waste, and breakage. Decay and waste will be estimated using VRI call grading/net factoring and NVAF sampling. Breakage will be estimated using existing loss factors.

3.3.2 Target Population

The target population will be the vegetated treed (VT) portion of the TSA located on crown land that is also considered operable by the operability linework. The operable area within the TSA will be priorized for ground sampling as it provides cost effective VRI ground sampling and focuses sampling activities in the portion of the landbase that is particularly important to the stakeholders.

3.3.3 Sample Size

An estimated 100 sample clusters should be installed in the VT area. These samples would be distributed among leading-species strata proportional to their area (Table 5).

Table 5. Approximate distribution of plots.

Leading Species	Area (%)	Number of plots
Hemlock-Balsam	55.6	55
Cedar (red & yellow)	23.0	23
Douglas-fir	17.6	18
Other*	3.8	4
Grand Total	*100.0*	*100*

*Pine, Spruce and deciduous

3.3.4 Sampling Approach

VRI Timber Emphasis Plots (TEP) should be used to gather data following the current VRI Ground Sampling Manual. These TEPs could provide a sampling framework for additional sampling, such as monitoring (where a subset of the TEPs would be re-measured over time).

3.3.5 Sample Selection

Sample polygons would be selected using the MSRM probability of selection proportional to size with replacement (PPSWR). The selection process would follow the procedures outlined in the document, "Sample Selection Procedures for Ground Sampling v3.3", which was produced by the Ministry of Sustainable Resource Management, Terrestrial Information Branch, in December 2002.

3.3.6 Net Volume Adjustment Factor Sampling

As per the MSRM standards, the net volume adjustment factor (NVAF) sampling is mandatory for the inventory. NVAF sampling involves detailed stem analysis of sample trees, calculation of actual net volume, and calculation of the ratio between actual net volume and estimated net volume; it will be used to statistically adjust the estimate of net merchantable volume of VRI ground samples.

The objective of the NVAF portion of the inventory is to complete destructive tree sampling and obtain local information for hidden decay, waste, and stem taper in order to statistically adjust the cruiser calls for net volume.

In the ground sampling phase of the NVAF process, ground sampling crews will provide detailed enhanced cruising (net factoring and call grading) of all the trees (live, dead, standing or fallen) within the selected auxiliaries at the same time as they are conducting regular timber emphasis sampling within the TSA. Once the enhanced data is collected then the NVAF enhanced tree data will be compiled in a tree matrix and a sample design for selected trees will be developed.

A minimum of 60 trees (50 live, 10 dead) will be selected from at least 17 VT polygons. The finalized ground-sampling plan will provide additional details on stratification of destructive sampling plots.

All NVAF planning and implementation will follow the Net Volume Adjustment Factor Sampling Standards and Procedures, MSRM, Version v4.0, March 2004

3.3.7 Implementation

The timber inventory should be coordinated with photo-interpretation work and be implemented as follows:

- Step 1- a small batch of sample clusters (e.g., 40) should be installed over the target population in the first field season (or first half of field season). Re-calculate the sample size based on new CV estimates.
- Step 2- install remaining plots in the second field season (or the second half of a field season), if required.

A VPIP for ground sampling should be developed following MOF guidelines in *Vegetation Resources Inventory Guidelines for Preparing a Project Implementation Plan for Ground Sampling.*

3.4 Costs

Estimated sample sizes and preliminary costs for the TSA VRI activities are listed in Table 6. More accurate and detailed costs will be included in the VPIPs.

3.5 Monitoring

MSRM is responsible for monitoring this VRI planning process and ensuring that the final VSIP is approved.

Table 6. Estimated sample sizes and costs for VRI in the VFD.

VRI activity	Sample size	Unit Cost ($)	Total Cost ($)
PHOTO INTERPRETATION			
a) **Photography**			357,527.80
Total Photo interpretation			
GROUND SAMPLING			
b) **TEP[4]– Vegetated Treed**			
Phase II Clusters	100	TBD	
NVAF sampling (trees)	60	TBD	
WPV sampling (polygons)			
Subtotal TEP – VT			
Total Ground sampling			*TBD*
OTHER COSTS			
Quality assurance (10% of ground sampling cost)[5]			
Project management (20% of ground sampling cost)[6]			
Statistical analysis			
Total Other			
Grand Total			

[4] Timber Emphasis VRI ground sampling.

[5] This quality assurance is for ground sampling only (not photo interpretation). It is done by a check-cruiser, and it involves checking 10% of the field crew work using the MSRM quality assurance procedures and standards.

[6] These project management costs are for ground sampling; they will vary by project and how projects are managed (e.g. projects may be managed in-house).

APPENDIX I – STAKEHOLDERS

Table 7. List of stakeholders in the Strathcona TSA.

Agencies	**Participant**
MSRM Terrestrial Information Branch	Jon Vivian, Will Smith, Derek Challenger
MOF Campbell River Forest District	John Andres
Licensees	**Participant**
BC Timber Sales	Bruce McKerricher
Canadian Forest Products Ltd.	Patrick Bryant
Hecate Logging Ltd.	Paul Pashnik
International Forest Products Ltd.	Gerry Sommers
Nootka First Nations	Dean Wanless
Nootka Sound Economic Development Commission	Cliff Lovestrom
Raven Lumber Ltd.	John Howe
TFL Forest Ltd. (TimberWest)	Jim McPhalen
Western Forest Products Inc.	David Byng
Weyerhaeuser Company Ltd.	Peter Kofoed

APPENDIX II – GLOSSARY OF TERMS

Ground Sampling

Ground sampling is the field measurement of timber, ecology, range, and/or coarse woody debris values at one or more locations within each sample polygon. Sample polygons are selected using the probability proportional to size with replacement (PPSWR) method. To accommodate a wide variety of resources, various types and sizes of sampling units (e.g., fixed and variable plots, transects) are used to make the measurements.

Inventory Unit

An inventory unit is the target population from which the samples are chosen. The inventory unit could be a specific a geographic area (e.g. TFL or TSA) where a specific set of attributes is needed. The size of the inventory unit depends upon the sampling objectives.

Landcover Classification

The BC Land Cover Classification Scheme (BCLCS) was designed specifically to meet VRI requirements, in addition to providing general information useful for "global vegetation accounting" and "integrated resource management." The BCLCS is hierarchical and reflects the current state of the landcover (e.g., presence or absence of vegetation, type and density of vegetation) and such fixed characteristics as landscape position (i.e., wetland, upland, alpine). There are two main classes of polygons: Vegetated and Non-Vegetated.

Management VRI

Management VRI are specialized inventories that provide detailed information required for specific resource management, i.e., day-to-day forest management. One or more VRI sampling procedures may be used for management inventories. Management inventories may focus on specific resource types (e.g., timber, range, ecology), geographic areas (e.g., landscape unit, TFL), attribute sets (e.g., Douglas-fir leading stands, age class 4+). They may use one or more of the following tools (e.g., photo-interpretation, ground sampling, NVAF sampling).

National Forest Inventory (NFI)

The NFI provides information on Canada's resources across all provinces and allows the Federal Government a consistent framework for reporting on Canada's inventory,

including reporting on the Criteria and Indicators and the Kyoto protocols. The inventory unit for the NFI is the entire country, although it is implemented province-by-province. BC's provincial CMI system will provide the data needed for the NFI as well as provincial reporting.

Net Volume Adjustment Factor (NVAF) Sampling

NVAF sampling provides factors to adjust net tree volume estimated from net factoring and taper equations. The adjustment accounts for hidden decay and possible taper equation bias. NVAF sampling involves detailed stem analysis of sample trees, calculation of actual net volume, and calculation of the ratio between actual net volume and estimated net volume (where estimated net volume is obtained from net factoring and taper equations). The NVAF (and VRI net factoring) replaces the existing loss factors for inventory applications. It does not, however, replace the loss factors for revenue applications.

Photo-Interpretation

Photo-interpretation involves subjective delineation of polygons and photo estimation of attributes for all polygons in an inventory unit. Medium scale aerial photographs (1:15,000) are most often used in photo-interpretation. However, if existing photo-based inventory is acceptable, the database can be translated into VRI format and upgraded to include the additional VRI attributes.

Post-Stratification

Post-stratification involves dividing inventory unit into mutually exclusive sub-populations (strata) *after* ground sampling has been completed. Samples that fall in each post-stratum are analyzed separately and the results are applied to the corresponding population post-strata to improve the precision of the inventory's overall averages and totals.

Pre-Stratification

Pre-stratification divides an inventory unit into mutually exclusive sub-populations (strata) *before* ground sampling to provide estimates for specific areas, or to increase the confidence in the overall estimates by considering special characteristics of each stratum.

Resource-Specific Interpretations

Resource-Specific Interpretations (RSI) use the Resource Inventory Committee (RIC) standard VRI baseline data products (provincial CMI or management inventory), in combination with other data sets and analysis (outside of that required to produce VRI), to produce information to address specific-resource management issues (e.g., TSR review, important ecosystems and habitats). These interpretations include ecosystem interpretations and habitat interpretations.

Sample Size

The sample size for an inventory is the minimum number of ground samples to be established in an inventory unit to meet the target precision.

Statistical Analysis

Statistical analysis or adjustment is the process of adjusting the values of the photo-interpretation variables using ground sampling observations. Ground observations are compared to photo-estimated values to develop adjustment factors by species groups. These factors are then applied to the polygons in the photo interpretation database to produce the final adjusted database.

Sub-unit

Sub-unit describes the inventory unit within an Inventory Unit. For example, if the inventory unit is defined as the Vegetated Treed area in a TSA, then a sub-unit may be defined by a specific geographic area (e.g., operable landbase) or stand type (e.g., problem forest types) within the Vegetated Treed area in the TSA.

Target Precision

Target precision expresses the amount of variation in key attributes (e.g., timber volume) desired in the final results. Target precision, usually expressed as the coefficient of variation (CV), is used to calculate the minimum sample size for subsequent ground sampling. The current target precision for timber volume is $\pm$10% (90% or 95% probability); stakeholders define the probability (uncertainty) level.

Vegetation Resources Inventory (VRI)

VRI is an improved vegetation inventory process for assessing quantity and quality of BC's vegetation resources. The VRI process is designed to include a flexible set of sampling procedures for collecting vegetation resource information. The VRI is essentially a toolbox of procedures, which include:

- *Photo-interpretation*: the delineation of polygons from aerial photography and the estimation of resource attributes.
- *Ground sampling*: the establishment of plot clusters in selected polygons to measure timber, ecological, and/or range attributes.
- *NVAF Sampling*: stem analysis sampling of individual trees for net volume adjustment.
- *WPV Sampling*: intensive sampling of selected polygons to determine the error between the estimated attribute values and the "true" attribute values.
- *Statistical Adjustment*: the adjustment of the photo-interpreted estimates for all polygons in an inventory unit or management unit using the values measured during ground sampling.

The VRI can be deployed over the entire province measuring timber and non-timber resources, or over a large management unit (management VRI) measuring selected resources in specific portions of the landbase. The VRI sampling process produces spatial and non-spatial databases that can be used in multiple resource management applications including timber, ecosystem, and wildlife habitat management.

Within Polygon Variation Sampling

WPV sampling provides information for expressing the true individual polygon error, assessed as the difference between the adjusted polygon value and the "true" value for that polygon. The "true" value for the polygon is an estimate derived from a small sample of polygons that are intensively sampled on the ground.